

System Quality, Service Quality, and Electronic Medical Record Adoption: User Satisfaction as Mediator in Regional Hospital Outpatient Care

Synthia Sari Toha¹, Rokiah Kusumapradja², Rian Adi Pamungkas²

RSUD Dr. Dradjat Prawiranegara, Serang, Indonesia

Article information	Abstract
<p>Article history: Received: April 01th, 2026 Revised: May 30th, 2026 Accepted: June 11th, 2026</p> <hr/> <p>Corresponding author: Name: Synthia Sari Toha Address: Jl. Rumah Sakit Umum No.1, Kotabaru, Kec. Serang, Kota Serang, Banten 42112. E-mail: rokiah.kusumapradja@esaunggul.ac.id</p> <hr/> <p>International Journal of Nursing and Health Services (IJNHS), Volume 9, Issue 3, June 20th, 2026 DOI: 10.35654/ijnhs.v9i3.930 E-ISSN: 2654-6310</p>	<p>Background: Electronic medical record (EMR) adoption is essential for improving documentation accuracy, information accessibility, service efficiency, and patient safety. In outpatient care, EMR adoption is particularly important because healthcare professionals work in a high-volume and time-sensitive service environment. Objective: This study aimed to examine the effects of system quality and service quality on EMR adoption, with user satisfaction as a mediating variable, among healthcare professionals in a regional hospital outpatient department. Method: A quantitative cross-sectional analytical study was conducted among 97 Care Provider Professionals in the outpatient department of Dr. Dradjat Prawiranegara Regional Hospital, Serang. Respondents were selected using purposive sampling. Data were collected using a structured questionnaire and analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS). Result: User satisfaction had a positive and significant effect on EMR adoption ($\beta = 0.600$; $t = 4.075$; $p < 0.001$). System quality significantly influenced user satisfaction ($\beta = 0.202$; $t = 2.805$; $p = 0.005$) and EMR adoption ($\beta = 0.506$; $t = 5.573$; $p < 0.001$). Service quality significantly influenced user satisfaction ($\beta = 0.770$; $t = 12.540$; $p < 0.001$), but its direct effect on EMR adoption was not significant ($\beta = -0.164$; $t = 0.966$; $p = 0.334$). The model explained 83.3% of the variance in user satisfaction and 78.4% of the variance in EMR adoption. Conclusion: EMR adoption in outpatient care is primarily influenced by system quality and user satisfaction. Service quality contributes to EMR adoption indirectly by improving user satisfaction rather than through a direct pathway. Recommendation: Hospitals should strengthen EMR system reliability, responsive technical support, user-centered training, and routine user satisfaction monitoring to sustain EMR adoption.</p>
<hr/> 	<p>Keywords: electronic medical record; system quality; service quality; user satisfaction; outpatient care</p> <p>This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International License CC BY -4.0</p>

INTRODUCTION

Electronic medical records (EMRs) are an important component of digital health transformation because they support the electronic recording, storage, retrieval, and exchange of patient information (1,4-6). In hospital services, EMR systems can improve documentation accuracy, reduce duplication, support clinical decision-making, and enhance the continuity of care (5,6,8). However, the benefits of EMR systems depend not only on system availability but also on the extent to which healthcare professionals adopt and use the system in routine clinical practice (4,7,10).

Outpatient care is a distinct and important context for EMR adoption. Compared with inpatient units, outpatient departments often manage a high volume of patients, shorter consultation times, rapid clinical decision-making, and repeated documentation across multiple professional groups (1,8,9). In this context, system delays, limited accessibility, unclear interfaces, or slow technical support can directly disrupt patient flow and increase the administrative burden of healthcare professionals (5,10). Therefore, understanding the determinants of EMR adoption in outpatient care is essential for improving digital health performance at the service-unit level (1,9).

The DeLone and McLean Information System Success Model provides a useful framework for evaluating EMR adoption (2). The model suggests that system quality and service quality shape user satisfaction, which subsequently influences system use and net benefits (2). System quality reflects the technical performance of the EMR, including ease of use, reliability, accessibility, response time, flexibility, and functionality, while service quality represents the quality of support provided to users (2,6,11). User satisfaction reflects users' overall evaluation of system performance and support after interacting with the EMR system (3).

Previous studies have shown that system quality and service quality are associated with user satisfaction and information system success (6,7,11,12). Nevertheless, many studies still emphasize direct relationships among these constructs, while the psychological and experiential

mechanism that translates technical and service characteristics into adoption behavior remains less clearly explained (2,3,12). In particular, the mediating role of user satisfaction in linking system quality and service quality with EMR adoption has not been sufficiently examined in outpatient care settings in regional hospitals (9,12).

This study addresses this gap by examining whether user satisfaction mediates the relationship between system quality, service quality, and EMR adoption among Care Provider Professionals in the outpatient department of Dr. Dradjat Prawiranegara Regional Hospital, Serang. The findings are expected to contribute to the refinement of the DeLone and McLean model in the context of hospital EMR adoption and provide practical guidance for strengthening user-centered digital health strategies in outpatient services (1,2,9).

OBJECTIVE

This study aimed to examine the effects of system quality and service quality on EMR adoption, with user satisfaction as a mediating variable, among healthcare professionals in the outpatient department of a regional hospital.

METHODS

Design and Setting

This study used a quantitative cross-sectional analytical design. The study was conducted in the outpatient department of Dr. Dradjat Prawiranegara Regional Hospital, Serang, Indonesia.

Population, Sample Size, and Sampling Technique

The study population consisted of all Care Provider Professionals who used the EMR system in the outpatient department. The final sample consisted of 97 respondents. The sample size was considered adequate for SEM-PLS because it exceeded the minimum requirement based on the 10-times rule and was appropriate for the number of structural paths in the model (13). Respondents were recruited using purposive sampling to ensure that the participants had direct experience using the EMR system in outpatient care.

The inclusion criteria were: (1) healthcare professionals working in the outpatient department, including physicians, nurses, and other clinical staff; (2) active users of the EMR system; (3) at least six months of work experience in the outpatient department; and (4) willingness to participate by providing informed consent. The exclusion criteria were: (1) healthcare professionals on leave during data collection; (2) staff who did not use EMR in their daily work; and (3) respondents who submitted incomplete questionnaires.

Instruments

Data were collected using a structured self-administered questionnaire adapted from the DeLone and McLean Information System Success Model and previous studies on EMR evaluation and health information system adoption (2,3,7,11,12). The questionnaire consisted of four constructs: system quality, service quality, user satisfaction, and EMR adoption. All items were measured using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

System quality was measured using 7 items covering ease of use, reliability, response time, accessibility, flexibility, and functionality. An example item was: "The EMR system is easy to access and use during outpatient services." Service quality was measured using 13 items covering responsiveness, technical support, assurance, empathy, training, and problem resolution. An example item was: "Technical support is available when I experience problems using the EMR system." User satisfaction was measured using 13 items covering overall satisfaction, satisfaction with system performance, information access, support, and usefulness. An example item was: "Overall, I am satisfied with the performance of the EMR system." EMR adoption was measured using 13 items covering regular use, perceived usefulness, routine integration, intention to continue use, and acceptance. An example item was: "I regularly use the EMR system in my daily outpatient work."

The questionnaire was reviewed for content validity by three validators with expertise in hospital administration, health information systems, and nursing/clinical management. In the main analysis, construct

validity and reliability were evaluated using the SEM-PLS measurement model through outer loading, Average Variance Extracted (AVE), Cronbach's alpha, composite reliability (ρ_a and ρ_c), and discriminant validity assessment (13).

Data Collection Procedure

After obtaining permission from hospital management, eligible healthcare professionals were invited to participate. The purpose of the study, voluntary nature of participation, confidentiality of responses, and right to withdraw were explained to all potential participants. Respondents who agreed to participate completed the questionnaire independently. The researcher checked returned questionnaires for completeness, and incomplete responses were excluded from analysis. No personally identifiable information was recorded in the dataset.

Data Analysis

Data were analyzed using descriptive statistics and SEM-PLS. Descriptive statistics were used to summarize respondent characteristics. The measurement model was assessed using outer loading, Cronbach's alpha, composite reliability, and AVE. The structural model was evaluated using R-square, adjusted R-square, Q-square predictive relevance, path coefficients, t-statistics, p-values, and specific indirect effects (13). A path was considered statistically significant when the t-statistic was greater than 1.96 and the p-value was less than 0.05 (13).

Ethical Consideration

This study received ethical approval from Universitas Esa Unggul. All respondents provided informed consent before participating. Participation was voluntary, and respondents could withdraw at any time without consequences. Data confidentiality was maintained by anonymizing all questionnaires and using the data only for research purposes.

RESULTS

Respondent Characteristics

A total of 97 healthcare professionals participated in this study. The majority were female (64.0%). The largest age group was

older than 50 years (40.2%). Most respondents reported frequent EMR use (89.7%), and half had used EMR for one to two years (50.5%).

Table 1. Respondent Characteristics

Variable	Category	n	%
Gender	Male	35	36.0
	Female	62	64.0
Age	24-35 years	7	7.2
	36-45 years	30	30.9
	46-50 years	21	21.7
	>50 years	39	40.2
EMR use	Sometimes	10	10.3
	Often	87	89.7
Duration of EMR use	<1 year	6	6.2
	1-2 years	49	50.5
	2-3 years	33	34.0
	>3 years	9	9.3

Measurement Model

Table 2 presents the construct reliability and convergent validity results. All constructs met the recommended thresholds, with

Cronbach's alpha and composite reliability values above 0.70 and AVE values above 0.50 (13).

Table 2. Construct Reliability and Convergent Validity

Construct	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE
User Satisfaction	0.949	0.951	0.956	0.625
Service Quality	0.964	0.966	0.968	0.700
System Quality	0.894	0.897	0.917	0.612
EMR Adoption	0.955	0.956	0.960	0.652

Structural Model

The structural model demonstrated strong explanatory power. System quality and service quality explained 83.3% of the variance in user satisfaction. System quality, service

quality, and user satisfaction explained 78.4% of the variance in EMR adoption. Predictive relevance was also acceptable because the Q-square values were greater than zero (13).

Table 3. Structural Model Evaluation

Endogenous Construct	R-square	Adjusted R-square	Q-square
User Satisfaction	0.833	0.830	0.561
EMR Adoption	0.784	0.777	0.586

Direct Effects

Table 4 shows the direct effects among variables. User satisfaction and system quality had significant direct effects on EMR

adoption. Service quality significantly influenced user satisfaction but did not have a significant direct effect on EMR adoption.

Table 4. Direct Effects

Path	β	t-statistic	p-value	Interpretation
------	---------	-------------	---------	----------------

User Satisfaction -> EMR Adoption	0.600	4.075	<0.001	Significant
Service Quality -> User Satisfaction	0.770	12.540	<0.001	Significant
Service Quality -> EMR Adoption	-0.164	0.966	0.334	Not significant
System Quality -> User Satisfaction	0.202	2.805	0.005	Significant
System Quality -> EMR Adoption	0.506	5.573	<0.001	Significant

Indirect Effects

The mediation analysis indicated that user satisfaction mediated the relationship between system quality and EMR adoption and the relationship between service quality

and EMR adoption. This suggests that user satisfaction is an important mechanism through which technical and support-related factors influence EMR adoption.

Table 5. Indirect Effects

Indirect Path	Indirect β	p-value	Interpretation
System Quality -> User Satisfaction -> EMR Adoption	0.121	0.017	Significant mediation
Service Quality -> User Satisfaction -> EMR Adoption	0.462	<0.001	Significant mediation

DISCUSSION

This study found that user satisfaction and system quality were the main determinants of EMR adoption in the outpatient department. System quality had a significant direct effect on both user satisfaction and EMR adoption, indicating that technical characteristics of the EMR system are central to successful use in daily outpatient work. This finding is consistent with the DeLone and McLean Information System Success Model, which positions system quality as a core determinant of user satisfaction and system use (2). In outpatient services, system reliability, response time, accessibility, and ease of use are particularly important because healthcare professionals must complete documentation while managing high patient volumes and limited consultation time (8,9).

The strongest antecedent of user satisfaction was service quality. This indicates that responsive technical assistance, training, support, and problem resolution can improve how users evaluate the EMR system, which is consistent with previous EMR and information system studies (6,7,11,12). However, service quality did not have a

significant direct effect on EMR adoption. This finding suggests that support services alone may not immediately translate into routine EMR use when users still face technical barriers or workflow-related constraints. Instead, service quality appears to influence adoption indirectly by first improving user satisfaction. In practical terms, users may appreciate support services, but they are more likely to adopt EMR consistently when that support produces a satisfying experience and helps them complete clinical documentation efficiently (2,3,12).

The mediation findings provide an important contribution to the DeLone and McLean model in the context of hospital outpatient care (2). The results show that user satisfaction functions as a psychological and experiential mechanism that connects system quality and service quality with EMR adoption. This finding extends the model by emphasizing that EMR adoption is not only a technical outcome but also a user-centered process (2,3). A technically reliable system and responsive support services become meaningful for adoption when they increase users' satisfaction with system performance and usefulness (3,12).

For hospitals, these findings imply that EMR strengthening should not focus only on infrastructure procurement or policy enforcement. Hospital management should ensure that the EMR is stable, fast, accessible, and aligned with outpatient workflow (1,9). In addition, technical support should be timely and problem-oriented, and training should focus on real clinical scenarios such as rapid patient registration, documentation, prescription entry, laboratory requests, and follow-up care (7,10). Routine satisfaction monitoring can also help hospital leaders identify system problems and prioritize improvements based on user experience (3,12).

This study has several limitations. First, the cross-sectional design limits the ability to infer causal relationships over time. Second, data were collected using self-report questionnaires, which may introduce common method bias and social desirability bias. Third, the study was conducted in a single regional hospital outpatient department, which may limit generalizability to other hospital types or inpatient settings. Future studies should use longitudinal or mixed-method designs, include multiple hospitals, and examine additional variables such as information quality, organizational support, digital literacy, and workflow fit (2,9,12).

CONCLUSION

This study shows that EMR adoption in regional hospital outpatient care is mainly supported by system quality and user satisfaction. Service quality does not directly determine EMR adoption, but it plays an important indirect role by improving user satisfaction. These findings emphasize that successful EMR adoption requires both a reliable system and a satisfying user experience supported by responsive technical services (2,3,12).

RECOMMENDATION

- a. Hospital management should prioritize EMR system reliability by improving network stability, server capacity, system response time, data backup, and cybersecurity protocols (1,9).

- b. The IT support team should provide responsive technical assistance, structured troubleshooting procedures, and regular feedback mechanisms for healthcare professionals using the EMR system (7,10).
- c. EMR training should be practical and workflow-based, focusing on outpatient clinical scenarios, efficient data entry, use of templates, and patient safety documentation
- d. Hospitals should regularly measure user satisfaction and use the results to guide system improvement, vendor coordination, and digital health governance (3,12).

ETHICAL DECLARATIONS

This study was approved by IRB Universitas Esa Unggul. Written informed consent was obtained from all respondents before data collection. Data confidentiality: Respondent identities were anonymized, and all data were used only for research purposes.

Conflict of interest: The authors declare no conflict of interest.

REFERENCES

- (1) World Health Organization. Global strategy on digital health 2020-2025. Geneva: World Health Organization; 2021.
- (2) DeLone WH, McLean ER. The DeLone and McLean model of information systems success: a ten-year update. *J Manag Inf Syst.* 2003;19(4):9-30.
- (3) Oliver RL. A cognitive model of the antecedents and consequences of satisfaction decisions. *J Mark Res.* 1980;17(4):460-469.
- (4) Kruse CS, Kothman K, Anerobi K, Abanaka L. Adoption factors of the electronic health record: a systematic review. *JMIR Med Inform.* 2016;4(2):e19.
- (5) Nguyen L, Bellucci E, Nguyen LT. Electronic health records implementation: an evaluation of information system impact and

- contingency factors. *Int J Med Inform.* 2014;83(11):779-796.
- (6) Bossen C, Jensen LG, Udsen FW. Evaluation of a comprehensive electronic patient record system on the basis of the DeLone and McLean model for information system success. *BMC Med Inform Decis Mak.* 2013;13:113.
 - (7) Aldosari B, Al-Mansour S, Aldosari H, Alanazi A. Assessment of factors influencing nurses acceptance of electronic medical record in a Saudi Arabia hospital. *Inform Med Unlocked.* 2018;10:82-88.
 - (8) Tubaishat A. Perceived usefulness and perceived ease of use of electronic health records among nurses: application of Technology Acceptance Model. *Inform Health Soc Care.* 2018;43(4):379-389.
 - (9) Handayani PW, Hidayanto AN, Pinem AA, Sandhyaduhita PI, Budi I, Ayuningtyas D. Hospital information system institutionalization processes in Indonesian public, government-owned and privately owned hospitals. *Int J Med Inform.* 2016;95:17-34.
 - (10) Ajami S, Bagheri-Tadi T. Barriers for adopting electronic health records by physicians. *Acta Inform Med.* 2013;21(2):129-134.
 - (11) Al Kraiat Y, et al. The effect of system quality and service quality on electronic medical record success. *Int J Med Inform.* 2019;129:94-104.
 - (12) Wali RM, et al. User satisfaction and adoption of electronic health records: a systematic review. *Healthcare (Basel).* 2020;8(4):473.
 - (13) Hair JF Jr, Hult GTM, Ringle CM, Sarstedt M. *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*. 3rd ed. Thousand Oaks (CA): Sage; 2022.